

L1 ANSWER 24 OF 26 CAPLUS COPYRIGHT 1997 ACS

AN 1986:70229 CAPLUS

DN 104:70229

TI ***Recycling*** of ***carpet*** scraps

IN Moryama, Sadao; Kanekawa, Yutaka

PA Ikeda Bussan Co., Ltd., Japan; Hi-Sheet Industries Ltd.

SO Jpn. Kokai Tokkyo Koho, 4 pp.

CODEN JKXXAF

PI JP 60206868 A2 851018 Showa

AI JP 84-64808 840330

DT Patent

LA Japanese

IC ICM C08L101-00

ICS C08K007-02; D06M015-21

CC 40-1 (Textiles)

Section cross-reference(s): 38, 60

AB Scraps from a ***carpet*** comprising synthetic fibers with a thermoplastic resin backing are pulverized and kneaded with a thermoplastic resin compatible with a resin for backing at a temp. between m.p. of resins and the fiber to give a backing material. Thus, scraps from an ***automobile*** ***carpet*** contg. a polyester and a polyamide fiber with a low-d. polyethylene backing was pulverized and kneaded with 65% ethylene-vinyl acetate copolymer at 170.degree. to give a backing material contg. uniformly dispersed fibers.

ST polyester fiber ***carpet*** ***recycling*** ; polyamide fiber ***carpet*** ***recycling*** ; polyethylene ***carpet*** backing ***recycling*** ; vinyl acetate copolymer ***carpet*** ***recycling*** ; ethylene copolymer ***carpet*** scrap ***recycling*** ; nylon fiber ***carpet*** ***recycling***

IT Polyamide fibers, uses and miscellaneous

Polyester fibers, uses and miscellaneous

RL: USES (Uses)

(***carpet*** scraps contg., with polyethylene backings, ***recycling*** of, for backing materials)

IT ***Carpets***

(scraps, contg. nylon and polyester fibers with polyethylene backings, ***recycling*** of, for backing materials)

IT 9002-88-4

RL: USES (Uses)

(***carpet*** scraps with backing of, ***recycling*** of, for backing materials)

IT 24937-78-8

RL: USES (Uses)

(***carpet*** scraps with polyethylene backings mixed with, in manuf. of ***recycled*** backing materials)

July 1, 1993 3:30pm Page 1

prt fu

-1- (WPAT)
AN - 85-299683/48
XRAM- C85-129734
TI - Mfg. backing resin for carpets - using material left from cutting carpets
mixed with thermoplastic synthetic resin
DC - A95 F07
PA - (HIGH-) HIGH SEAT KOGYO KK
NP - 2
PN - J60206868-A 85.10.18 (8548) JP
J86000390-B 86.01.08 (8605) JP
PR - 84.03.30 84JP-064808
AP - 84.03.30 84JP-064808
IC - C08K-007/02 C08L-101/00 D06M-015/21
AB - (J60206868)

Mfr. of a backing resin for a carpet utilises a material left from cutting a carpet comprising a carpet material (made from thermoplastic synthetic fibre) and a backing material (made from thermoplastic material having the lower m.pt. and smaller compatibility than those of the carpet material). The remaining material is crushed and mixed with a thermoplastic synthetic resin having compatibility and adhesive properties to the backing material. The mixt. is melted at a temp. below the m.pt. of the carpet material and above the m.pt. of the backing material and added resin.

USE/ADVANTAGE - A backing resin can be prepd. from the material which remained from cutting a carpet. It is useful for lowering the cost of a carpet. (4pp Dwg.No.0/5)

SS 4?

⑨ 日本国特許庁(JP)

⑩ 特許出願公開

⑪ 公開特許公報(A)

昭60-206868

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識別記号

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C 08 L 101/00

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C 08 K 7/02

6681-4J

D 06 M 15/21

6768-4L

審査請求 有 発明の数 1 (全4頁)

⑭ 発明の名称 カーベット用バックリング樹脂の製造方法

⑮ 特 願 昭59-64808

⑯ 出 願 昭59(1984)3月30日

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明 細 書

1. 発明の名称

カーベット用バックリング樹脂の製造方法

2. 特許請求の範囲

(1) 熱可塑性合成繊維にて織成したカーベット材に、該カーベット材の素材樹脂に対して相溶性が小さく、融点の低い熱可塑性合成樹脂よりなるバックリング材を裏打ちしたカーベットの裁断端材等の不要材を粉砕し、該粉砕した小片に前記バックリング材と相溶性があり、かつ前記バックリング材の素材樹脂と接着力のある熱可塑性合成樹脂を添加混合し、該混合物をカーベット材の溶融点未満、バックリング材及び添加樹脂の溶融点以上の温度にて加熱溶融することと特徴とするカーベット用バックリング樹脂の製造方法。

(2) 前記カーベット材の素材樹脂がナイロン、ポリエステルであり、添加樹脂が低密度ポリエチレン、エチレン酢酸ビニールコポリマー、

エチレンメタアクリル酸コポリマー並びにこれらのグラフト重合による誘導体である特許請求の範囲第1項記載のカーベット用バックリング樹脂の製造方法。

3. 発明の詳細な説明

(産業上の利用分野)

この発明はカーベットより排出する裁断端材等の不要材を利用してカーベット用バックリング樹脂を製造する方法に関するものである。

(従来の技術)

一般に、自動車室内に敷設するカーベットはポリエステル繊維等の熱可塑性合成繊維よりなるスパン糸にて得た基布に、ナイロン等の熱可塑性合成繊維よりなるスパン糸でループを形成したカーベット材に、自動車走行時の振動或いはエンジン音等の騒音に対する遮音効果を高めるために、低密度ポリエチレン等の熱可塑性合成樹脂よりなるバックリング材が裏打ちされている。従って、通常のカーベットに比較してコストが高くなることは避けられない。

ところが、自動車室内に敷設するカーベットの敷設傾斜に合わせて裁断するとき等において大量の裁断端材が発生する。この裁断端材等の不要材は通常では産業廃棄物として廃棄処分していたが、資源有効利用の観点からは極めて不経済であった。

最近では裁断端材等の不要材を溶融して再利用する試みがされているが、上述の如くバックキグ材として用いられる熱可塑性合成樹脂はカーベットの材に用いられる熱可塑性合成樹脂の素材樹脂とは相溶性がなく、しかも融点が低いため、前記裁断端材等の不要材を溶融して再利用するためにはこれらを分離して各々溶融しなければならず、分離に手間がかかり、却ってコストアップを招くという問題があった。

(発明の目的)

この発明は上記の問題を解消するためのもので、カーベットの不要材を利用して強度、寸法安定性、型保持性、遮音性、耐摩耗性等において優れた特性をもつカーベットのバックキグ材

脂を安価に製造できる方法を提供することを目的としている。

(発明の構成)

この発明は熱可塑性合成樹脂にて構成したカーベットの材に、該カーベットの素材樹脂に対して相溶性が小さく、融点の低い熱可塑性合成樹脂よりなるバックキグ材を裏打ちしたカーベットの裁断端材等の不要材を粉碎し、該粉碎した小片に前記バックキグ材と相溶性があり、かつ前記バックキグ材の素材樹脂と接着性のある熱可塑性合成樹脂を添加混合し、該混合物をカーベットの溶融点未満、バックキグ材及び添加樹脂の溶融点以上の温度にて加熱溶融することによって、上記目的を達成したものである。

(実施例)

次に、この発明を添付図面に示す実施例に基づいて説明する。

第1図において、1は自動車室内に敷設するためのカーベットの材で、該カーベットの1はポリエステル樹脂等の熱可塑性合成樹脂よりなるスバ

ン糸にて得た基布2aにナイロン等の熱可塑性合成樹脂よりなるスパン糸でループ2bを形成したカーベットの材(500~800g/㎡)2に、低密度ポリエチレン等の熱可塑性合成樹脂よりなるバックキグ材(300~800g/㎡)3を裏打ちしてなる。

4は前記カーベットの1を自動車室内等の敷設傾斜を固定して裁断され、裁断後に排出した裁断端材で、該裁断端材4は既知の粉碎機(図示せず)を用いて第3図示の如く小片5、5…に粉碎する。この小片5、5…は目標として一辺が3mm前後が好ましいが、これに限定する必要はない。この場合におけるカーベットの材2を構成する樹脂の繊維長は0.1~10mm(一辺を3mm前後を目標として粉碎した場合のバラツキの範囲である。)となる。尤も、繊維長が0.1mm~10mmの範囲外のものも含まれることもあるが、0.1mm以下の繊維は繊維としての形態がなく、後記する如き繊維含有による複合効果には影響しないし、繊維長が10mmを超える場合には却っ

て強度に影響することがあり、取り除くようになる。

前記の如く粉碎により得た小片5、5…は前記バックキグ材3と相溶性のある新たな樹脂例えば低密度ポリエチレン、エチレン酢酸ビニルコポリマー、エチレンメタアクリル酸コポリマー、更に、それらのグラフト重合による誘導体等のうち一種類又は数種類の組合せで1~4部添加し、ブレンダー(図示せず)にて混合して押出し成形機6にて溶融しつつ押出し成形する。

なお、前述の如く粉碎した小片5が3mm以下の場合にはカーベットの材2の繊維がバックキグ材3より分離して高比直の小さい綿状になる。かかる場合には予めヘンシルミキサー等の造粒機(図示せず)により前記添加樹脂とともにヒートミキシングしてバックキグ材3の樹脂を溶融混合した後、クーラミキサーにかけて造粒処理することが必要となる。この造粒時に添加する樹脂はこれが低密度ポリエチレン(LOPE)で

あるときは小片/LOPE=8/2程度でよいものである。

前記の如く造粒するか、造粒せずして押出し成形機6に掛けた小片5は添加樹脂とともに加熱攪拌されつつ金型を通してシート状に押出され、該シートが未だ可塑性を保持する間に第4図示の如く原反リール7より引出ローラ8、ガイドローラ9、9を経て引出されたカーベツト材2の裏面に導かれ、1対の圧着ロール10、10間にて圧着(バックキグ)されることとなる。この場合、前記混合物を押出し成形機により溶融するに当たり、その溶融温度は粉碎された小片5を構成するカーベツト材の溶融点未満で、同小片のバックキグ材及び添加樹脂の溶融点以上の温度にて行われ、カーベツト材の繊維部分まで溶融させないようにし、溶融樹脂中には第5図示の如く含有繊維11がそのまま残るようにしている。該繊維の含有はカーベツト用バックキグ樹脂としての強度、寸法安定性等において優れた特性を付与させるものである。

次に、この発明を前記実施例に基いて具体的に実施した例を説明する。

カーベツト材1はポリエステル繊維よりなるスパン糸にて得た基布2aにナイロン繊維よりなるスパン糸でループ2bを形成したカーベツト材(630g/㎡)2に低密度ポリエチレン樹脂よりなるバックキグ材(600g/㎡)3を裏打ちしてなるものを用いた。このカーベツト1を自動車室内等の敷設領域に応じて裁断して得た裁断端材4を、ハンマー形プラスチック粉碎機(図示せず)にて3φの大きさに粉碎して小片5、5…とし、次に、この小片5、5…を35重量部にエチレン酢酸コポリマー65重量部を添加して、ヘンシルミキサー(図示せず)にて攪拌し、前記添加樹脂とともに170℃までヒートミキシングシテバックキグ材3の樹脂を溶融混合した後、クローラミキサーにかけて造粒処理し、粒状の樹脂を得た。そしてこれを押出成形機6にかけ、前記実施例に述べた方法を条件下でカーベツト材2に圧着(バックキグ)したもので

ある。特に、溶融温度はバックキグ材及び添加樹脂の融点以上の温度にて、かつカーベツト材の溶融点未満の温度にすることが必要である。

このようにして得たバックキグ樹脂は粉碎された合成繊維のスパン糸が様に分散されていた。

(発明の効果)

このように、この発明は熱可塑性合成繊維にて構成したカーベツト材に、該カーベツト材の基材樹脂に対して相溶性が小さく、融点の低い熱可塑性合成樹脂よりなるバックキグ材を裏打ちしたカーベツトの裁断端材等の不要材を粉碎し、該粉碎した小片に前記バックキグ材と相溶性があり、かつ前記バックキグ材の基材樹脂と接着性のある熱可塑性合成樹脂を添加混合し、該混合物をカーベツト材の溶融点未満、バックキグ材及び添加樹脂の溶融点以上の温度にて加熱溶融することを特徴としているので、得られる溶融樹脂中には繊維がそのまま残るため、所謂FRP(繊維強化プラスチック)と同様の結

核との複合効果により、強度、寸法安定性、形保持性、遮音性等いずれの点においても優れた特性をもつバックキグ樹脂がカーベツトの不要材を原料として低コストにて製造することができる。

従って、この発明によればカーベツトの裁断端材等の不要材を産業廃棄物として処分することなく、有効利用できるという優れた効果を奏するものである。

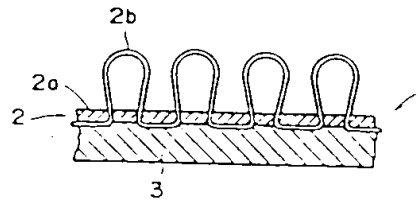
なお、この発明の上記実施例では自動車室内に敷設するカーベツトの裁断端材の有効利用について説明しているが、住宅、事務所、ホテル等の室内に敷設するカーベツトの裁断端材等の不要材についても該カーベツトが熱可塑性合成繊維にて構成したカーベツト材に、該カーベツト材の基材樹脂に対して相溶性が無く、融点の低い熱可塑性合成樹脂よりなるバックキグ材を裏打ちしたものである限り、同様に適用できることは言うまでもない。

4. 図面の簡単な説明

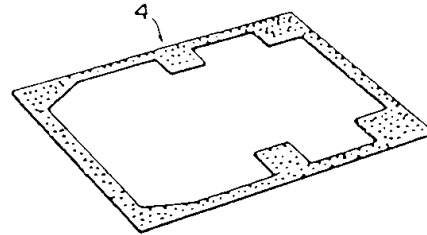
第1図はカーベットの概略断面図、第2図はカーベットの裁断端材の斜視図、第3図は端材を粉砕した小片の斜視図、第4図はカーベットの製造装置の概略断面図、第5図はこの発明より得たパッキング用脂を塗打ちした場合の断面図である。

- | | |
|----------|----------|
| 1…カーベット | 2…カーベット材 |
| 2a…基布 | 2b…ループ |
| 3…パッキング材 | 4…裁断端材 |
| 5…粉砕した小片 | 6…押出し成形機 |
| 11…含有繊維 | |

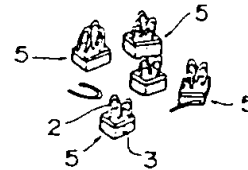
第1図



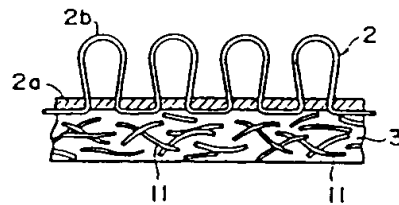
第2図



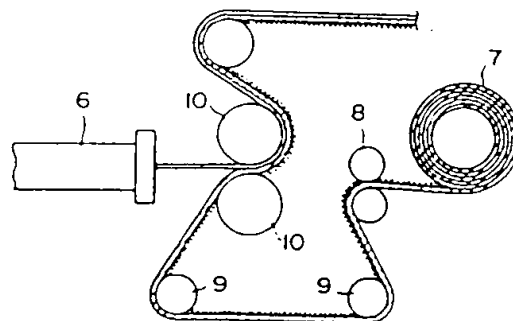
第3図



第5図



第4図



代理人 弁理士 羽 村 行 弘



APPENDIX A



TRANSLATION

(19) PATENT BUREAU OF JAPAN (JP) (12) OFFICIAL GAZETTE FOR UNEXAMINED PATENTS (A)

(11) Japanese Patent Application Kokai: Sho 60-206868

(43) Disclosure Date: October 18, 1985

Number of Inventions: 1

Request for Examination: Requested

(Total of 4 pages)

(51) <u>Int. Cl.</u> ⁴	<u>JP Cl.</u>	<u>Intrabureau No.</u>
C 08 L 101/00		7445-4J
C 08 K 7/02		6681-4J
D 06 M 15/21		6768-4L

(54) Title of the Invention

Method for the preparation of carpet backing resin

(21) Application No.: Sho 59-64808

(22) Filing Date: March 30, 1984

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SPECIFICATION

1. Title of the Invention

Method for the preparation of carpet backing resin

2. Patent Claims

(5) (1) A method for the preparation of carpet backing resin, characterized by using the following process. First, waste carpet materials, such as unused edge pieces, etc., are ground to small chips. The carpet materials are made from thermoplastic synthetic fibers and lined with a backing material formed by a thermoplastic synthetic resin, which has a low melting point and a low miscibility with the matrix resin of the carpet. Then, a thermoplastic synthetic resin, which has a high miscibility with the backing material mentioned above and high adhesion to the backing resin mentioned above, is added and mixed with the small chips. (10) Finally, the resulting mixture is heated and melted at a temperature below the melting point of the carpet matrix resin but above the melting points of the resin added and the backing material.

(15) (2) The method for the preparation of carpet backing resin described in Claim (1), in which the matrix resin of the carpet materials mentioned above is nylon or polyester and the resin added is low-density polyethylene, ethylene/vinyl acetate copolymer, ethylene/methacrylic acid copolymer, or their derivatives prepared through graft polymerization.

3. Detailed Explanation of the Invention

(20) Industrial field of utilization

This invention is related to a method for the preparation of carpet backing resin using waste carpet materials, such as unused edge pieces, etc.,

Prior art

(25) Usually, the carpet used in automobiles consists of spun yarn loops of a thermoplastic synthetic fiber, such as nylon fiber, etc., formed on a base fabric made from spun yarn of a thermoplastic synthetic fiber, such as polyester fiber, etc. In addition, automobile carpet must be lined with a backing material made from a thermoplastic synthetic resin, such as low-density polyethylene, etc., to improve the sound insulation effect against noise, such as engine

noise, vibration noise, etc., generated when the automobile is running. Therefore, as compared to the carpet used in a house, the carpet used in automobiles is more expensive.

(5) However, in the process of manufacturing automobiles, the carpet must be cut into certain sizes and shapes to fit into the areas in automobiles. As a result, the process generates a lot of unused edge pieces and these edge pieces are currently treated as industrial waste. From the point of view of utilizing raw materials, this is not cost-effective.

(10) Recently, it has been attempted to melt and reuse the edge pieces, etc. However, since the thermoplastic synthetic resin used as the backing material described above has a melting point and no miscibility with the matrix resin used in the thermoplastic synthetic fiber of the carpet, the two resin materials must be separated and melted separately in order to recycle and reuse the edge pieces, etc. This will significantly increase the cost.

Purpose of the invention

(15) The purpose of this invention is to solve the problem mentioned above and to provide a cost-effective method for the preparation of carpet backing resin, which utilizes waste carpet materials, such as unused edge pieces, etc., and is able to provide products with excellent strength, dimensional stability, shape retention, sound insulation effect, wearability, etc.

Constitution of the invention

(20) This invention concerns a method for the preparation of carpet backing resin, characterized by using the following process. First, waste carpet materials, such as unused edge pieces, etc., are ground to small chips. The carpet pieces are made from a thermoplastic synthetic fiber and are lined with a backing material formed from a thermoplastic synthetic resin, which has a low melting point and low miscibility with the matrix resin of the carpet. Then, a thermoplastic synthetic resin, which has a high miscibility with the backing material mentioned above and high adhesion to the backing resin mentioned above, is added and mixed
(25) with the small chips. Finally, the resulting mixture is heated and melted at a temperature below the melting point of the carpet matrix resin but above the melting points of the added resin and the backing material.

Practical Examples

In the following, this invention is explained in detail with practical examples shown in the figures attached.

(5) In Figure 1, 1 is a piece of carpet suitable for use in automobiles. Carpet 1 is made from carpet material 2 with a thickness of 500 - 800 g/cm², which is formed by spun yarn loops 2b made of thermoplastic synthetic fibers, such as nylon fiber, etc., on base fabric 2a formed by spun yarns made of thermoplastic synthetic fibers, such as polyester fiber, etc. Carpet material 2 is lined with backing material 3 with a thickness of 300 - 800 g/cm², made of a thermoplastic synthetic resin, such as low-density polyethylene, etc.

(10) As shown in Figure 2, 4 are remaining edge pieces after carpet 1 with a certain size and shape has been cut to fit into a certain area within automobiles. Then, unused edge piece 4 is further ground to small chips 5, 5, ... shown in Figure 3 using a common grinder (not shown in the figures). Small chips 5, 5, ... usually have an edge length of about 3 mm, although the size is not strictly limited. As a result, the length of the fiber in carpet material 2 will be in the range of 0.1 - 10 mm (a distribution range when the edge length of the small chips is about 3 mm). Due to the distribution, some fibers may have a length outside the range of 0.1 - 10 mm. If the fiber length is shorter than 0.1 mm, the fiber loses its shape as a fiber, but using the short fibers will not decrease the composite effect described below. On the other hand, however, using fibers with a length longer than 10 mm may affect the strength of the composite material and the long fibers should be removed.

(15)

(20)

In the method of this invention, 1 - 4 parts of a new resin having a high miscibility with backing material 3 described above are added and mixed with the small chips 5, 5, ... obtained above using a blender (not shown in the figures). The new resin can be one or more resin materials selected from low-density polyethylene, ethylene/vinyl acetate copolymer, ethylene/methacrylic acid copolymer, and their derivatives, prepared through graft polymerization. Then, the mixture is melted and extruded from extruder 6.

(25)

When small chips 5 described above have a size under 3 mm, the fibers in carpet material 2 may separate from backing material 3 to form a cotton-like substance with a low bulk density. In this case, the small chips should be premixed with the resin added through a heat-mixing process using a Henschel mixer (not shown in the figures). After the resin used in

(30)

backing material 3 is sufficiently melt-mixed, granulation is carried out on a cooler mixer. When the resin added during the granulation is low-density polyethylene (LDPE), the ratio of the small chips to LDPE should be 8 to 2.

(5) The granulation process may also be omitted. Thus, small chips 5 and the resin added are melt-kneaded together and simultaneously extruded into a sheet through a die on extruder 6. While still adhesive, the sheet is placed on the back of carpet material 2 which has been pressed out through restoring reel 7, drawing roller 8, and a pair of guiding rollers 9 and 9 shown in Figure 4. Then the sheet is pressed (backing) onto carpet material 2 through a pair of pressing rollers 10 and 10. In the process, the mixture mentioned above is melted and
(10) extruded from the extruder at a temperature below the melting point of the carpet material used in small chips 5, but above the melting point of the backing material of the small chips and the melting point of the resin added. As shown in Figure 5, since the fiber part of the carpet material is not melted, fiber 11 will remain intact in the melted resin. As the backing resin for carpet, the intact fiber is able to provide excellent strength, dimensional stability, etc.

(15) Next, based on the practical example described above, this invention is explained in more detail with another practical example.

Carpet 1 was made from carpet material 2 with a thickness of 630 g/m^2 , lined with backing material 3 with a thickness of 600 g/m^2 . Carpet material 2 was formed by spun yarn loops 2b made of nylon fibers on base fabric 2a made from spun yarns of polyester fibers.
(20) Backing material 3 was made of a low-density polyethylene resin. According to the area in automobiles, carpet 1 was cut into a certain size and shape, generating edge pieces 4. Edge pieces 4 were further ground into small chips 5, 5, ... of about 3 mm in diameter using a hammer-type plastic grinder (not shown in the figure). Next, small chips 5, 5, ..., 35 weight units, were added to 65 weight units of ethylene/vinyl acetate copolymer. The resulting
(25) mixture was mixed in a Henschel mixer (not shown in the figures) and heated to 170°C . After the resin in backing material 3 was melted and mixed, the resin mixture was granulated using a cooler mixer to give resin granules. Finally, the granulated resin material was extruded from extruder 6 to form a sheet, which was pressed (backing) onto carpet material 2 under certain conditions with the method described above. Especially, the temperature used in the melt-extruding process was below the melting point of the carpet material but above the melting
(30) point of the backing material and the melting point of the resin added.

The backing resin thus obtained contained uniformly the ground spun yarns of synthetic fibers.

Significance of the invention

- (5) The method of this invention is characterized by using the following process. First, waste carpet materials, such as unused edge piece, etc., are ground to small chips. The carpet materials are made from thermoplastic synthetic fibers and lined with a backing material formed by a thermoplastic synthetic resin, which has a low melting point and a low miscibility with the matrix resin of the carpet. Then, a thermoplastic synthetic resin, which has a high miscibility with the backing material mentioned above and high adhesion to the backing resin
- (10) mentioned above, is added and mixed with the small chips. Finally, the resulting mixture is heated and melted at a temperature below the melting point of the carpet matrix resin but above the melting point of the resin added and the melting point of the backing material. Since the fibers remain intact in the melted resin, a composite effect with the fibers like in so-called FRP (fiber-reinforced plastics) can be obtained. As a result, a backing resin with excellent strength,
- (15) dimensional stability, shape retention, sound insulation effect, etc., can be prepared at a low cost by utilizing waste carpet materials.

Therefore, according to this invention, waste carpet materials, such as unused edge pieces, etc., can be effectively recycled and reused without being treated as an industrial waste. The method of this invention is very cost-effective.

- (20) Moreover, in the practical examples described above, waste carpet materials, such as unused edge pieces, etc., generated from the process of manufacturing automobiles were effectively utilized as the raw material. However, any waste carpet materials, such as unused edge pieces, etc., generated from decoration and remodeling processes of residences, homes, offices, hotels, etc., can also be used, as long as the carpet is made from thermoplastic
- (25) synthetic fibers and lined with a backing material made of a thermoplastic synthetic resin, which has a low melting point and no miscibility with the matrix resin of the carpet.

4. Brief description of the drawings

Figure 1 is a schematic drawing of the cross section of a carpet. Figure 2 is an oblique drawing of an unused edge piece of a carpet. Figure 3 is an oblique drawing of the small chips obtained through grinding the edge piece. Figure 4 is a schematic drawing of the cross section of the equipment for carpet manufacturing. Figure 5 is a schematic drawing of the cross section of a carpet lined with a backing resin prepared with the method of this invention.

- 1 Carpet
- 2 Carpet material
- 2a Base fabric
- 2b Loop
- 3 Backing material
- 4 Edge piece
- 5 Ground small chips
- 6 Extruder
- 11 Fibers contained

Figure 1

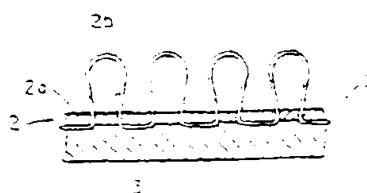


Figure 2

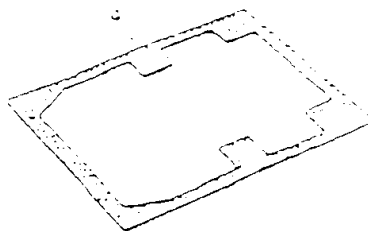


Figure 3

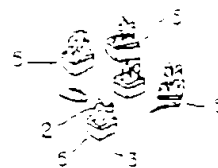


Figure 4

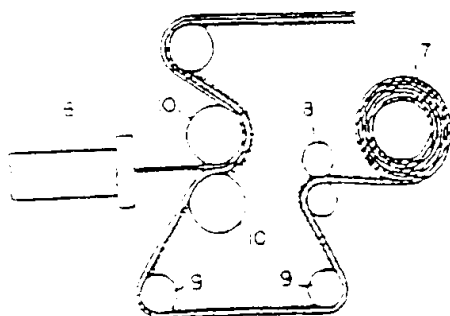


Figure 5

